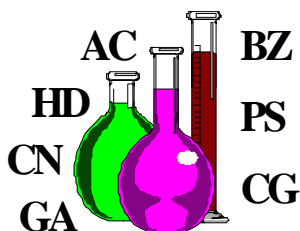


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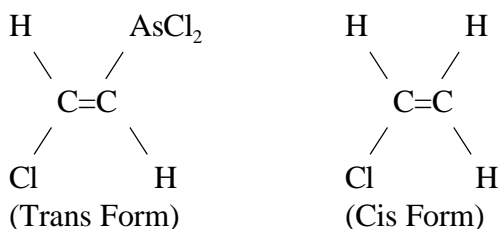


*Detailed Facts About Blister Agent Lewisite  
(L)*

218-14-1096

*Physical Properties of Lewisite*

*Chemical structure*



*Chemical Formula*



*Description*

Pure Lewisite is a colorless, oily liquid with very little odor. The plant sample (war gas) has a geranium-like odor and is an amber to dark brown liquid.

*Molecular Weight*

207.32

*Vapor Pressure (mm Hg)*

0.35 @ 25°C  
0.22 @ 20°C

*Boiling Point*

197°C (Trans)                      170°C (Cis)

*Freezing Point*

-1°C (Trans)                      -45°C (Cis)

*Density*

Liquid = 1.89  
Vapor = 7.1 (air=1)

*Solubility*

Insoluble in H<sub>2</sub>O; soluble in ordinary organic solvents.

*Flash Point*

None

*Volatility*

1,060 mg/m<sup>3</sup> @ 0°C  
4,480 mg/m<sup>3</sup> @ 20°C  
8,620 mg/m<sup>3</sup> @ 30°C

### ***Toxicity Values***

IC <sub>50</sub> (eyes)	= <300 mg-min/m <sup>3</sup>
LC <sub>50</sub> (inhalation)	= 1,200 to 1,500 mg-min/m <sup>3</sup>
LC <sub>50</sub> (skin)	= >1,500 mg-min/m <sup>3</sup>
LC <sub>50</sub> (skin vapor exposure)	= 100,000 mg-min/m <sup>3</sup>
LDL <sub>0</sub> (skin)	= 20 mg/kg
1% Lethality	= 150 mg-min/m <sup>3</sup>
No Deaths Level	= 100 mg-min/m <sup>3</sup>
NOAEL (oral)	= 0.5 to 1.0 mg/kg (estimated based on animal studies)

### ***Exposure Limits***

Workplace Time-Weighted Average -	0.003 mg/m <sup>3</sup>
General Population Limits -	0.003 mg/m <sup>3</sup>

## ***Toxic Properties of Blister Agent Lewisite***

*Lewisite stored in the unitary stockpile is in ton containers. Stockpile is at Tooele Army Depot, UT.*

### ***Overexposure Effects***

L is a vesicant (blister agent); also, it acts as a systemic poison, causing pulmonary edema, diarrhea, restlessness, weakness, subnormal temperature, and low blood pressure. In order of severity and appearance of symptoms, it is: a blister agent, a toxic lung irritant, absorbed in tissues, and a systemic poison. When inhaled in high concentrations, it may be fatal in as short a time as 10 minutes. L is not detoxified by the body. Common routes of entry into the body include ocular, percutaneous, and inhalation.

### ***Emergency and First Aid Procedures***

Inhalation: remove from the source immediately; give artificial respiration if breathing has stopped; administer oxygen if breathing is difficult; seek medical attention immediately.

Eye Contact: speed in decontaminating the eyes is absolutely essential; remove person from the liquid source; flush the eyes immediately with water for 10-15 minutes by tilting the head to the side, pulling eyelids apart with fingers, and pouring water slowly into the eyes; do not cover eyes with bandages, but if necessary, protect eyes by means of dark or opaque goggles; seek medical attention immediately.

Skin Contact: remove victim from source immediately and remove contaminated clothing; immediately decon affected areas by flushing with 10 percent sodium carbonate solution; wash off with soap and water after 3 to 4 minutes to protect against erythema; seek medical attention immediately.

Ingestion: do not induce vomiting; give victim milk to drink; seek medical attention immediately.

### ***Protective Equipment***

Protective Gloves: Wear Norton Chemical Protection Glove Set, M3 Butyl Rubber.

Eye Protection: Wear protective eye glasses as a minimum; use goggles and face shield for splash hazards.

Other: Wear full protective clothing (Level A) consisting of M3 Butyl rubber suit with hood, M2A1 boots, M3 gloves, impregnated underwear, M9 series mask and coveralls (if desired), or the 30 mil Demilitarization Protective Ensemble (DPE) if available, or NIOSH-approved equivalent; wear gloves and lab coat with M9, M17, or M40 mask readily available for general lab work.

In addition, wear daily clean smock, foot covers, and head covers when handling contaminated lab animals.

### ***Reactivity Data***

Stability: Reasonably stable; however, in presence of moisture, it hydrolyses rapidly, losing its vesicant property.

Incompatibility: Corrosive to steel at a rate of  $1 \times 10^{-5}$  to  $5 \times 10^{-5}$  in/month at 65 °C.

Hazardous Decomposition Products: It hydrolyses in acidic medium to form HCl and non-volatile (solid) chlorovinylarsenious oxide, which is a less potent vesicant than Lewisite. Hydrolysis in alkaline medium, as in decontamination with alcoholic caustic or carbonate solution, produces acetylene and trisodium arsenate ( $\text{Na}_3 \text{AsO}_4$ ). Therefore, decontaminated solution would contain toxic arsenic.

***Persistence*** Somewhat shorter than for HD; very short duration under humid conditions.

### ***References***

1. Department of the Army Field Manual (DA FM) 3-9, *Potential Military Chemical/Biological Agents and Compounds*, 1990.

2. Pechura, C.M, and Rall, D.P., eds, *Veterans at Risk: The Health Effects of Mustard Gas and Lewisite*, Institute of Medicine, National Academy of Sciences, National Academy Press, Washington, D.C., 1993.
3. U.S. Army Chemical Research, Development and Engineering Center, *Material Safety Data Sheet: Lewisite*, January 1991.
4. U.S. Army Chemical Command Materiel Destruction Agency, *Site Monitoring Concept Study*, 15 September 1993.

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